ITS Public Safety Program

U.S. Department of Transportation
Federal Highway Administration

Integrated Communications System Speeds Traffic Recovery After Crashes on New York City Streets

At a time when homeland security concerns demand interagency solutions, the Integrated Incident Management System (IIMS) provides critical emergency management links between New York City and New York State transportation agencies and public safety agencies.

Driving in New York City is slow enough when traffic is flowing smoothly. Add a crash or other roadway incident to the mix, and highway backups often last for hours. The good news is that on selected highway patrol routes in all five boroughs, traffic recovery times are being reduced significantly thanks to a state-of-the-art, multi-agency mobile integrated communications network.

With support from the U.S. Department of Transportation's (DOT's) ITS Public Safety Program, the Integrated Incident Management System (IIMS) is being tested by the New York State Department of Transportation (NYSDOT), the New York City Police Department (NYPD), the New York City Department of Transportation (NYCDOT), and several other city agencies. The IIMS system began operating in 2001. City and state officials use it to manage several roadway incidents each day.

Figure 1. Twenty-three emergency response vehicles are equipped with wireless remote laptop computers, video cameras and digital cameras.

Technology Reduces Roadway Clearance Time

With IIMS, response and clearance time can be reduced by a half-hour or more by eliminating the need for secondary responders to travel to the incident scene to make an on-scene assessment of the equipment and personnel needed for clearance.

In New York City, police typically are the first to arrive at the scene of a highway incident. The police notify other first responders as well as NYCDOT. The transportation agency's standard procedure is to dispatch a field supervisor to assess the scene, in order to determine the personnel and equipment needed for clearance, recovery, and infrastructure repair (such as towing and recovery vehicles, sanitation or hazmat equipment).

An average of 30 minutes of travel time is required for the field supervisors to reach the incident scene. Yet another half-hour typically is required for the second responders to navigate through traffic and to reach the scene.

With the IIMS, field supervisors are able to manage clearance, recovery and repair operations from the NYCDOT Transportation Management Center (TMC). The IIMS transmits images from the incident scene, along with precise location information produced by a

Figure 2. Van rollover incident occurred on the freeway, but the van rolled on to an arterial street below. IIMS enabled NYCDOT to immediately and accurately locate the incident and clear the street more quickly.

Global Positioning System (GPS) integrated with a Geographic Information System (GIS), and incident data entered into the IIMS by the responding officer on scene. By viewing the images and reviewing the IIMS data, field supervisors can quickly assess the situation and dispatch the appropriate type and quantity of response units.

Transportation officials can't rely blindly on information radioed in by first responders at the scene. Also, over-responding can be expensive, especially when overtime is a consideration. Over-responding may limit the availability of emergency crews and equipment needed elsewhere. Depending on the type of incident and the nature of its impact on the infrastructure, different crew expertise is required. The incident images give the field supervisors confidence in their remote dispatch decisions.

GPS More Reliable Than Voice Location

The location information provided by the IIMS also is very valuable, according to Nelson Castillo, Assistant Deputy Commissioner and Director of Communications, NYCDOT Office of Emergency Response. “GPS tells you right to the lane what needs to be closed off,” Castillo said.“Voice reports aren't always that accurate, and we often get conflicting reports from passersby, the police, and the DOT. For example, we had an incident where the IIMS images enabled us to see that an incident reported on a freeway actually was on the ramp.”

In the van rollover incident shown above, IIMS allowed NYCDOT to accurately locate the incident on an arterial street rather than on the highway as first reported. The van had rolled off the highway overpass on to the street below. The photos also helped NYCDOT to accurately determine the equipment needed to clean the roadway, and to determine the best approach direction for

reaching the incident. Shown opposite is an IIMS screen capture showing how the incident images and data appeared to users during the rollover incident.

IIMS Delivers Congestion Mitigation, Improved Safety and Enhanced Emergency Response

IIMS is designed to support inter-agency coordination of response to incidents ranging from minor roadway fender-benders to major emergencies.

The IIMS project was initiated in 1999 by NYSDOT Region 11, and initially funded through the Environmental Protection Agency's Congestion Mitigation and Air Quality (CMAQ) program with the goals of reduced congestion, improved safety and mobility, and increased efficiency and productivity.

The USDOT funding support, provided through the Intelligent Transportation Systems (ITS) Public Safety Program, provides for Field Operational Test (FOT) evaluation, outreach to the Public Safety and ITS communities, and support of ITS standards development and testing.

The major benefits of the IIMS include:

- More accurate, complete, and up-to-the-minute incident information, which benefits the public as well as responding agencies;
- real-time sharing of photos, data and other initial incident management information by all incident response agencies and centers, which is important for staging and guiding subsequent response support tasks;
- reduced traffic congestion and secondary incidents due to faster roadway clearance; and
- more efficient use of emergency resources due to reduced incident response time. Staff time and overtime hours are used more effectively because the right type and amount of equipment and staff is sent to each incident, and the need to dispatch supervisors often is eliminated.

While initial anecdotal assessments indicate that IIMS works well and is able to facilitate secondary response, a more formal evaluation is necessary to quantify benefits.

Performance Evaluation Will Quantify Benefits

A team of independent evaluators, funded by DOT, will study the effectiveness of the IIMS in:

- Reducing the time traffic is disrupted due to traffic incidents; and
- reducing the dispatch of unneeded resources.

The evaluators will attempt to determine how IIMS system performance may vary by incident type. Evaluation began in 2002 and will continue through 2003.

IIMS Demonstrates Effective Operational Partnerships Between Public Safety and Transportation Agencies

Responses to highway incidents and off-road emergencies require services from many agencies. These responses range from initial life-saving emergency medical services to less time-critical clean-up and roadside infrastructure repair services.

Turf battles stemming from differing agency missions can form a seemingly insurmountable barrier to coordinated and cooperative incident response. The IIMS project partners are proving that these institutional barriers can be overcome.

Led by the initial project sponsors, New York State Department of Transportation (NYSDOT), the IIMS was initially tested at emergency response and operations centers with data provided from 23 response vehicles owned by the:

- New York City Police Department (NYPD) and the
- New York City Department of Transportation (NYCDOT).

Additional funding from the U.S. Department of Transportation's (DOT's) ITS Public Safety Program made it possible to add additional participating agencies in the fall of 2002, including the:

- New York City Department of Environmental Protection (NYCDEP), and the
- New York City Department of Sanitation (NYC-DOS).

The linking of the public works operations centers is intended to demonstrate the benefit of integrating first and secondary emergency response as part of a coordinated multi-agency incident management program.

Several other New York City agencies also are supporting the operational test and will be involved in operational testing in Phase II of the project (2003 and 2004). These agencies include the:

- New York City Fire/EMS Department (FDNY/EMS);
- Metropolitan Transportation Authority—New York City Transit (MTA-NYCT);
- New York City office of Emergency Management (NYC-OEM); and the
- Metropolitan Transportation Authority—Bridges and Tunnels.

IIMS supports regional decision-making and coordination by providing a range of information for post-incident analysis. This, in turn, supports inter-agency planning.

IIMS Design and Configuration

IIMS relies on a distributed architecture. Servers are interconnected in peer-to-peer relationships, while workstations are connected to servers in a client/server relationship. An advantage of this distributed architecture is that the system is not dependent on any single center's server. If one center goes down, other centers can continue to operate. The IIMS utilizes Local Area Networks (LANs), Wide Area Networks (WANs) and Cellular Digital Packet Data (CDPD) for interconnection of servers and workstations. Wide Area Networking is accomplished with frame relay circuits and permanent virtual circuits. Wireless networking is accomplished

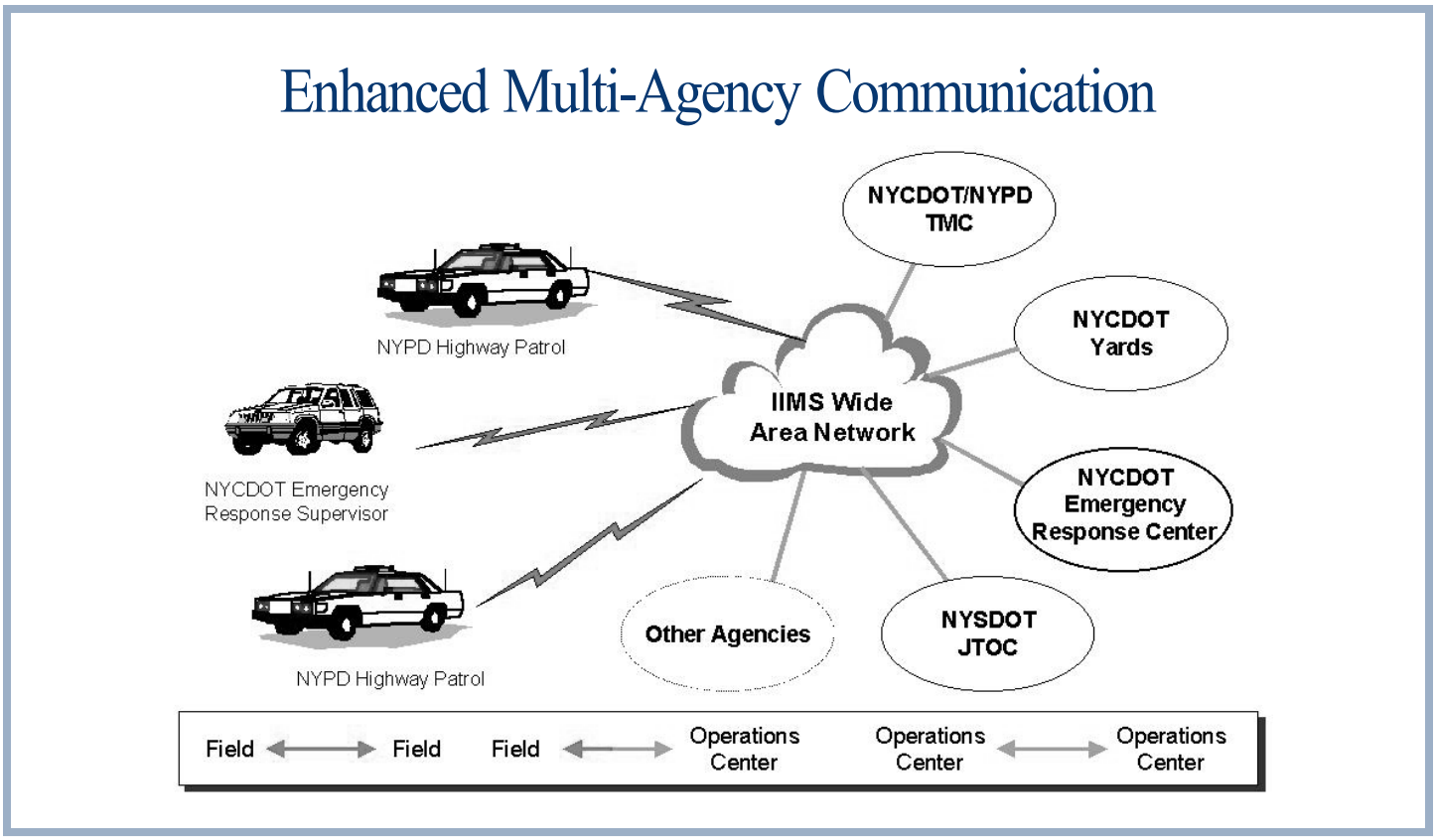

Figure 3. IIMS Wide Area Network Configuration

with CDPD. Local area networking is accomplished with Ethernet. Figure 3 shows the IIMS network configuration.

At this writing (January 2003), 23 vehicles were equipped with IIMS:

- 19 New York City Police Department Dedicated Mobile Highway Response Units in the Bronx, Brooklyn, Queens and Staten Island;
- 4 Second Response Mobile Highway Response Units owned by NYCDOT and NYSDOT.

The vehicles have wireless remote laptops equipped with IIMS incident data collection and management software, and GIS mapping capability integrated with a Global Positioning System (GPS). The GIS/GPS instantly locates the incident on a detailed GIS map. Each vehicle has a surveillance video camera as well as a digital camera. Still frames of the incident scene are captured from the video camera and integrated into the incident report. The mobile digital camera may be used to provide additional images of the scene. The NYPD radio frequency is used for voice communication.

The first officer on scene is prompted by the user-friendly software to enter text and numeric incident scene data that will enable the selection of proper responders and equipment for clearance. In addition to the digital images and GPS/GIS location information, the system collects and shares incident descriptive data, lane closure data, and incident response status.

IIMS Is Integrated With Legacy Systems

In many cities, law enforcement and transportation agencies perceive the existence of legacy systems and equipment as a major barrier to integration of public safety and transportation communication. The IIMS is demonstrating that system integration barriers can be overcome.

The IIMS is being integrated with the New York Police Department (NYPD) in-vehicle cameras and the New York City Department of Transportation (NYCDOT) Motorist Interchange Communication Environment (MICE) resource management system. Future plans call for integration of IIMS with the new NYPD Computer-Aided Dispatch (CAD) system, which is scheduled to be operational in 2003-2005.

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